

MCF DUST FILTER

**INSTALLATION, OPERATION
& MAINTENANCE MANUAL**



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It is the owner's responsibility to maintain the safety features included with this equipment. The safety features may include, but not necessarily be limited to: guards, access doors and covers, explosion vents, warning decals, caution decals, and advisory decals. Replacement safety features are available from MAC Equipment, Inc.



DO NOT attempt to operate this equipment until you have read and understood the contents of this manual. If you do not understand the contents of the manual bring it to the attention of your supervisor. This manual contains important safety instructions concerning the maintenance, use, and operation of this product. Failure to follow these instructions may result in serious injury or death.



NO haga funcionar este equipo hasta haber leído y comprendido el contenido de este manual. Si alguna parte del contenido del manual queda sin comprender, notifíquese a su supervisor. Este manual contiene instrucciones importantes en cuanto al antemiento, uso, y funcionamiento seguros de este producto. El no seguir las instrucciones contenidas en este manual podría ocasionar lesiones graves.

GENERAL INTRODUCTION

Congratulations on your selection of a MAC MCF Dust Filter. As the owner/operator of this unit you have an important responsibility to see that it is operated and maintained in a safe manner. The unit will require very little attention to keep it in good operating condition. This manual has been prepared to aid you in that effort.

Throughout this manual, reference may be made to various components which may or may not be part of your particular system. They are included in the interest of fully describing typical MCF filter systems.

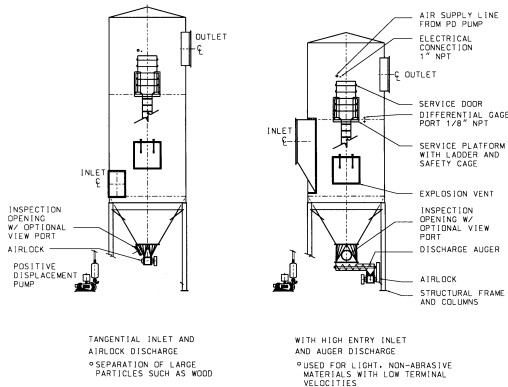


Figure 1-1 Typical MCF Dust Filter

Receiving Your Equipment

As soon as the equipment is received, it should be carefully inspected to make certain the unit is in good condition and all items listed on the packing list are received. Even though the equipment is mounted on heavy shipping skids at our plant it is possible for it to be damaged in shipment. All damages or shortages should be noted on the Bill of Lading. The purchaser must take immediate steps to file reports and damage claims with the carrier. All damages incurred to the unit in transit are the responsibility of the common carrier since it is the policy of MAC Equipment, Inc. to make shipment F.O.B. from its factory. Ownership passes to purchaser when the unit is loaded and accepted by carrier. Any claims for in transit damage or shortage must be brought against the carrier by the purchaser.

If the unit is not going to be assembled and installed soon after arrival, it should be stored in a warm, dry location to protect against corrosion. Filter bags and cages or cartridges must be stored in a dry, rodent proof location.

SAFETY INFORMATION

Do not attempt to operate or maintain this piece of equipment until you have read and thoroughly understood all of the safety information contained in this manual. All such information must be taken seriously. This piece of equipment contains moving parts and potential pinch points which can cause serious injury or death. If you do not understand anything in this manual seek assistance from your supervisor before operating this equipment.

Recognize Safety Information

The symbol at left is used to alert you to important safety messages located throughout this manual. It also appears on the equipment to alert you to potential hazards. When you see this symbol you must read, understand, and heed the information that accompanies it.

Understand Signal Words

DANGER !
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING !
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION !
Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and/or property damage.

Warning Decals And Guards

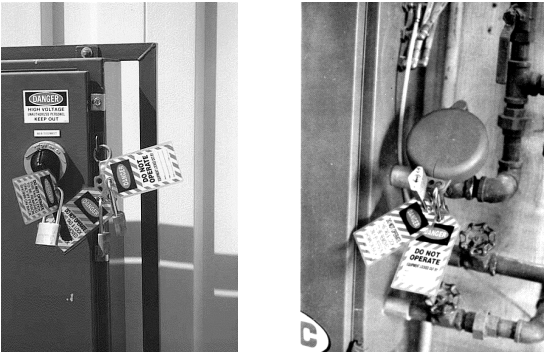
This piece of equipment contains several warning decals located in many different locations. It is the owner/operator's responsibility to maintain the integrity of these decals and to ensure that all operators of the equipment are aware of them and understand their meaning. Replacement decals are available free of charge from your MAC Equipment Service Representative, or by calling MAC Equipment Inc. at 1-888-821-2476.

This piece of equipment may contain one or more safety guards to protect the operator(s) from injury. It is the owner/operator's responsibility to maintain the integrity of these guards and ensure that they are in place when the equipment is in operation.

DO NOT attempt to operate this equipment with any guard removed. Replace damaged guards.

Lockout-Tagout Requirements

Before inspecting or servicing this equipment perform an approved lockout-tagout procedure on the electrical service, the compressed air (or other gas) supply, or any other energy source.



ELECTRICAL POWER COMPRESSED AIR OR GAS
Figure 2-1 Lockout and Tagout of Electrical Service and Compressed Air (or other gas)

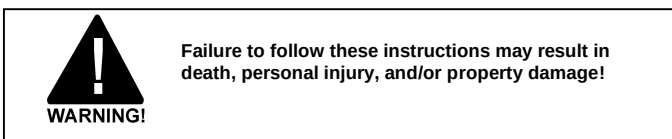
Control of this equipment must be in accordance with OSHA Standard 1910.147 "The control of hazardous energy (lockout-tagout)". This standard "requires employers to establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices and to otherwise disable machines or equipment to prevent unexpected energizing, start-up or release of stored energy in order to prevent injury to employees". For further information on Lockout-Tagout requirements, see your company's Safety Director or refer to OSHA Standard 1910.147.

Safety Precautions

Do not operate, inspect, or service this equipment unless all the following safety precautions are in effect:

- Guards, access doors, and covers are in place and secure.
- The equipment has been wired and grounded in accordance with all applicable codes.
- If air being filtered contains toxic materials all necessary precautions to protect personnel have been taken.
- An approved lockout-tagout procedure has been followed before the equipment is inspected, disassembled, and/or serviced. The equipment is automatically controlled and may start without warning unless energy supplies are properly disconnected and locked out-tagged out.
- The control panel enclosure is closed and secured except as is necessary for service or adjustment.
- The service door is closed and secured. Do not enter filter while the system exhaust fan is operating; air flow can pull service door closed, trapping personnel inside.
- A confined space permit, if required by authorities having jurisdiction, has been obtained prior to personnel entering the unit. Check with your company's safety director for special instructions, testing prior to entry, etc. that may be required by the specific application.

- Explosion vents have been properly installed and ducted, as described below in the Installation section. MAC PVC style explosion vents are shipped (when ordered) with (4) steel bolts. These bolts **must** be replaced with special plastic bolts before operating the filter.
- **Do not** cut, weld or grind on the filter while it is in operation; dust laden air may be highly explosive. Refer to the proper National Fire Protection Association Manual for information on cutting, welding or grinding in hazardous areas.
- The work area is clean and orderly, free of debris, materials, tools, etc.
- Operating personnel are wearing proper ear and eye protection and have secured loose hair, clothing, jewelry, etc.



Installation and Operation Cautions

- The MCF Cleaning arm timing is critical to the correct and efficient operation of these filters. Refer to the maintenance section for correct placement and adjustment of the timing.
- **BLOWERS and GEAR BOXES are shipped without lubrication oil**, do not operate before lubricating. Refer to the maintenance section for the lubrication schedule.
- All system piping must be clean internally before connecting to blower.
- Check lubrication level only when the equipment is stopped.
- Keep inlet filter clean.
- Keep belts properly tensioned and aligned.
- Keep pressure relief valves in good condition so that maximum pressure is not exceeded.
- Never attempt to regulate air flow by restricting intake or exhaust of a positive displacement blower.

NOTE: Full rated pressure is full pressure differential from inlet flange to discharge flange.

Read and Understand Safety Decals

Several safety labels are located on this piece of equipment to warn the operator(s) of potentially hazardous situations.

Decal Locations

The following figure shows typical locations for safety decals on the MCF filter. The locations of decals for your particular filter may vary from those indicated. Inspect your filter for locations of all decals.

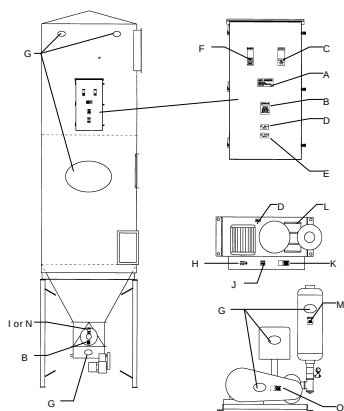


Figure 2-2 Typical Locations of Safety Decals (see next page for description of decals)

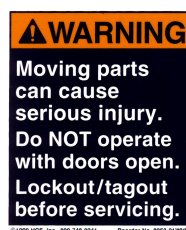
Safety Decals

Safety decals (and other information labels) may include, but are not necessarily limited to, the examples shown below. Locate all of the safety decals on your equipment and know their meaning prior to operating this dust filter. Free replacement decals are available; ask for decal kit P/N 413468.



End User must determine hazard level for entry permit requirements.

B.



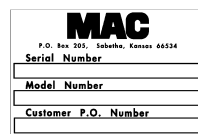
Equipment has moving blades, shaft, rotor or arm which may cause injury. It may also have valves discharging compressed gases.

C.



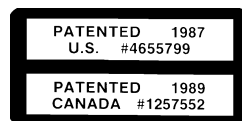
Equipment can start without warning. Exhaust fan can create enough force to close and hold service door closed.

D.



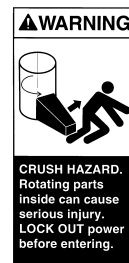
Typical MAC Equipment, Inc. nameplate.

E.



Typical MAC Equipment, Inc. MCF Filter Patent Numbers

F.



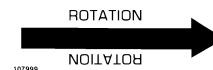
Equipment can start without warning. Cleaning Mechanism rotation can cause entrapment under cleaning arm which will induce serious injury.

G.



Typical MAC Equipment logo

H.



Equipment must rotate in direction indicated on rotation arrow.

I.



Equipment has rotating screw conveyor which may cause injury. Operate only when covers are in place.

J.



Equipment may be remotely controlled.



Disconnect, lockout and tagout electrical and all other energy sources before inspecting, cleaning or performing maintenance on this filter.

K.



Moving drive components can cause injury.



This warning sign reminds operators and other users that they must read and understand the Operator Manual before storing, installing, inspecting, cleaning or servicing the filter.

L.

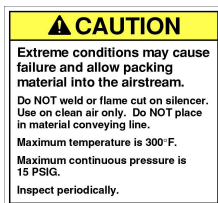


Check lubricant level before initial startup.



This filter may be remotely controlled. It can start without warning unless it is properly locked out at the motor starter or local disconnect. Do not rely on the control system for safe lockout.

M.



Do not weld or flame cut on silencer. May cause packing to enter into air stream and cause damage to cleaning mechanism.



Equipment can start without warning. This access port should be equipped with safety lock.

N.



Moving blades will cause severe injury.

O.



Do not operate equipment with guards removed.

PRINCIPLE OF OPERATION

The MCF filter is a top bag removal, pneumatically controlled, medium pressure high volume pulse cleaning dust filter. Cleaning air is generated by a positive displacement blower. MCF models range in size from a MCF112 with 1,086 sq. ft. of cloth to a MCF494 with 7,163 sq. ft. of cloth.

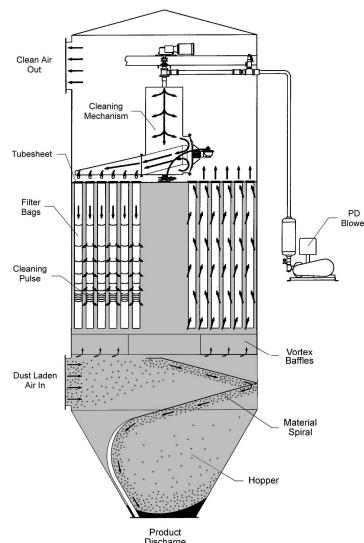


Figure 3-1 Principle of Operation

Air Flow through the Unit

Dust laden air enters the MCF through the tangential inlet near the bottom of the unit. A remote fan on the exhaust side draws air through the filter. A majority of the dust entering the unit is captured by the spiral and directed into the hopper and out the discharge. The remaining dust laden air is directed to the filter bags. Vortex baffles just below the filter bags straighten the air to prevent excessive wear on the bags. Filtered dust collects on the outside of the filter media. The MPHV cleaning mechanism pulses the dust off the filter bags and it drops into the hopper. Filtered air passes through the center of the filter bags and out through the clean air discharge at the top of the unit.

MPHV Cleaning

The MCF filter is a continuously operating self-cleaning filter. It uses MEDIUM PRESSURE HIGH VOLUME (MPHV) air to clean the bags. This air is supplied from a positive displacement blower located outside the unit. Cleaning air is stored in a tank within the clean air plenum. Cleaning air pressure climbs to approximately 7 psi within this tank before it is injected into the bags. A high volume blast of air is delivered by means of the MAC diaphragm valve. Cleaning air is channeled

In addition, if your filter is equipped with an explosion vent the following figure shows typical locations for other safety decals.

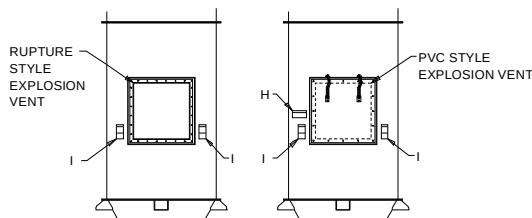


Figure 2-3 Typical Locations of Safety Decals for Explosion Vents

H.



Never use steel bolts in the explosion vent panel. Steel bolts will not allow the vent to function as designed

I.



Stay clear of explosion vent. During an explosion, flame, explosive gases or flying material will be released.

The following ISO decals may appear on your MCF Filter:

to the bags through a rotating arm. The cleaning arm has a series of nozzles correlated to the tube sheet layout. Cleaning air exits these nozzles and enters the bags. This action cleans the bags by: (1) creating a shock wave that pops the bag, and (2) forcing a momentary reverse flow of air through the bags.

MCF Timing

The unique feature of the MCF filter is its patented timing mechanism. Once adjusted, this device assures a blast of cleaning air is injected directly into the center of the bag, regardless of the rotational speed of the cleaning arm. This device is mechanical and does not require electrical power to internal solenoids for firing. Through the proper selection of gear ratios and rotational speeds the cleaning frequency can be adjusted.

Positive Displacement Blower

The MCF Filter requires a rotary positive displacement blower to supply the cleaning air. This blower has two figure-eight impellers rotating in opposite directions. As the impeller lobes pass the blower inlet, they trap a quantity of air. This entrapment occurs four times per revolution, moving the entrained air around the case to the blower outlet. Timing gears accurately position the impellers in relation to each other, maintaining the minute clearances so vital to the high volumetric efficiency of the rotary positive displacement blower. For further information on this equipment refer to the appendix.

Variable Cleaning Control Options: Air Diverter Valve

The Air Diverter Valve (ADV) cleaning cycle control is offered as an option on the MAC MCF filters. This valve provides an economical method of controlling the cleaning cycle of the filter. The cleaning cycle can be extend from the base time to any cycle time desired above this base. This is useful for filter applications that require a longer duration between cleaning pulses, to prevent over-cleaning the filter media.

To extend the cleaning cycle with the ADV, a timer, Photohelic gauge, or PLC is required. The ADV functions as a by-pass valve to the cleaning system. To initiate cleaning the valve is closed and air is allowed to flow to the cleaning mechanism. The valve is left closed for the duration of one cleaning cycle. To interrupt the cleaning cycle the valve is opened and cleaning air is exhausted to the atmosphere. The frequency of the cleaning cycle is controlled by adjusting the duration of the open state of the valve.

Variable Frequency Drives

Variable Frequency Drives (VFD) are offered as an alternate option for cleaning-cycle control on the MAC MCF Filters. This arrangement controls the speed of the rotating cleaning arm and blower, which directly controls the frequency of the cleaning cycle. Cleaning frequency, is adjustable above and below the base cycle. The extent of control is limited by the physical limitations of the drive and the motor. With this type of control, the filter is usually provided with a non-standard base cleaning cycle, falling in the center of the desired adjustment range. Refer to MAC Engineering Department for further details.

Air Exhaust

Returning filtered exhaust air into a facility can present hazards. The type of dust, it's characteristics and the effect of a recirculation system malfunction must be considered. If system design dictates that filtered air be returned into the facility, the buyer is cautioned to take appropriate steps to monitor the air quality and provide appropriate safeguards as prescribed by OSHA, NFPA, Federal, State and Local codes and regulations.



Never return filtered air to a habitable space or building without proper monitoring and precautions.

WARNING!

INSTALLATION

The MCF filter housing and internal components are shipped factory assembled. The support structure (if provided), magnehelic or photohelic pressure gauges, bags and cages, service platform and ladder/safety cage are shipped loose and require field assembly.

Location

Locate the MCF filter in a clear area away from normal personnel traffic on a flat and solid concrete or steel surface. Locate the filter so as to minimize supply and exhaust ductwork and so that explosion venting, if required, can be directed so that injury to personnel and damage to property **cannot** occur. Provide sufficient space for emptying the hopper and maintaining the unit.



During an explosion, a vent will release flame, explosive gases or flying material. The explosion venting must be directed away from personnel to prevent injury.

DANGER!

Foundation

The filter requires an adequate foundation, designed by a qualified structural engineer. Refer to the General Dimension drawings of your system for foot pad layout and weights. When calculating the loading for the foundation, the weight of the filter, material collected, and all auxiliary equipment must be considered together with snow, wind and seismic loads.

Support Structure

A support structure may be supplied by MAC Equipment, Inc. as part of your MCF filter system. The figure below shows a typical structure, which will vary from system to system depending on the size of the MCF filter.

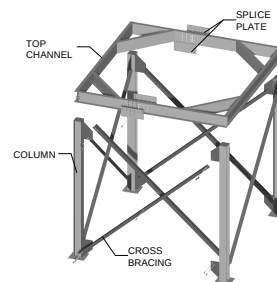


Figure 4-1 Typical Support Structure

To install the support structure:

1. Review the components of the support structure.
2. Set anchor bolts in the foundation according to the plan drawing. Position four columns on anchor bolts as indicated. Install nuts but do not tighten.
3. Attach cross bracing to (4) sides with grade A325, ¾" UNC (as provided) bolts, washers, and nuts.
4. On 10 ft., 12 ft., 13 ft., and 14 ft. diameter filters, bolt halves of top channel frame together with grade A325, ¾" UNC bolts (as provided), washers, nuts, and splice plate both sides of channel.
5. Lift channel frame onto columns and bolt together with grade A325, ¾" UNC (as provided) bolts, wedge washers, flat washers, and nuts.
6. Check the structure is square and plumb.
7. Tighten all bolts. Bolts must be tightened before allowing the structure to support the weight of the filter.
8. Touch-up paint on the support structure as needed. Assembly should be complete and all bolts tightened prior to painting.

High Entry Inlet

This inlet may be mounted with the filter horizontal.

To install the high entry inlet:

1. Remove the bolted shipping cover from the high entry inlet opening.
2. Apply a bead of silicone caulk around the inlet assembly flange. Lift inlet into position and bolt with 1/2-13 x 1" lg. bolts with flat washers.

NOTE: The sloped end of the inlet assembly must be toward the filter bottom

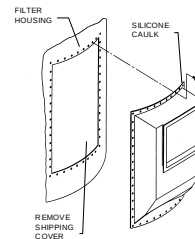


Figure 4-2 Typical High Entry Inlet



With the inlet mounted the filter will be unbalanced when lifted to the vertical position.

CAUTION!

Tangential Inlet

The tangential inlet requires only the addition of the fourth side of the inlet flange.

To install the tangential inlet angle:

1. Locate a 2-1/2" x 2-1/2" angle with bolt holes in both legs. One leg will match the bolt pattern drilled into the outside of the inlet.
2. Apply a bead of silicone caulk and bolt the angle in place with 1/2-13UNC x 1" lg. bolts with flat washers.

Service Platform (see figure 4-3 and 4-4)

Platform may be mounted with the filter horizontal.

To install the front access service platform: (see figure 4-3)

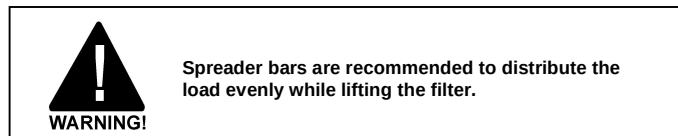
1. Align holes in service platform with holes in platform adapter located below service door.
2. Bolt together with ½"UNC (as provided) bolt, nuts, and lock washers.
3. Position support clips over holes with weld-ons on both sides of service door and secure in position with ½"UNC (as provided) bolts and lock washers.
4. Attach (2) flat bar supports from clips to holes in both sides of service platform. Secure in position with ½"UNC (as provided) bolts, nuts, lock washers, and flat washers.

To install the side access service platform: (see figure 4-4)

1. Align holes in service platform with holes in platform adapter located below service door.
2. Bolt together with ½"UNC (as provided) bolt, nuts, and lock washers.
3. Position support clip over holes with weld-ons below platform adapter and secure in position with ½"UNC (as provided) bolts and lock washers.
4. Attach (2) angle supports from clips to angles on bottom side of service platform. Secure in position with ½"UNC (as provided) bolts, nuts, lock washers, and flat washers.

Setting in Place

It is recommended that a properly sized crane be used for unloading the filter and setting it in place.



To set up the MCF filter:

1. Lift the filter housing and set in place on the support structure. Bolt the filter to the structure with 5/8" UNC (as provided) bolts, lock washers, flat washers, wedge washers, and nuts. Tighten all bolts before removing the crane.

Ladder, Safety Cage, and Ladder Stand-off

Ladder and safety cages will come in pre-assembled 6 ft., 4 ft., or 3 ft. lengths and (1) 8 ft. section without a safety cage attached.

To assemble ladder and safety cages: (see figure 4-3)

1. Position ladder and safety cage assemblies on ground end to end with the entry section at either end. (Note: If ladder rungs are not 12" apart flip section end for end.)
2. Join ladder side rails together with splice plate (as provided), 3/8" UNC bolts, and locknuts.
3. Join lower safety cage bars to upper safety cage hoop using 3/8" UNC bolts and locknuts. (Note: safety bars should be on the inside of safety hoop.)
4. After all sections are joined together lift ladder into position and attach to service platform.
5. Position stand-off clips over holes with weld-ons located below service door and secure in position with ½"UNC (as provided) bolts and lockwashers.
6. Attach ladder stand-off to clips with ½"UNC (as provided) bolts, nuts, and flatwashers. Level stand-off and clamp to ladder rail. Pilot drill through hole in stand-off into ladder rail on both sides. Secure stand-off to ladder rail with ½"UNC (as provided) bolts, nuts, and flatwashers. (Note: Stand-off to ladder connection can be welded or bolted.)
7. Measure distance from bottom of ladder rung to ground. Cut 8 ft. section to this length. (Note: Check to make sure what end will maintain the 12" distance from rung to rung and cut the opposite end.) Join ladder side rails together as described in step #2.
8. Position ladder foundation clip by clamping to the bottom of the ladder rail and pilot drill through (2) holes in foundation clip into ladder rail on both sides. Secure stand-off to rail with 3/8" UNC (as provided) bolts and locknuts. Secure foundation clip to ground. (Note: Foundation clips to ladder connection can be welded or bolted.)

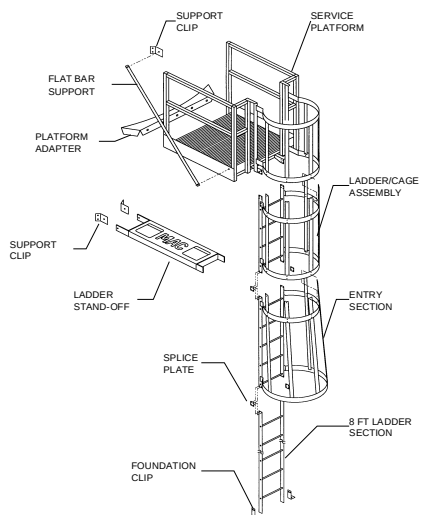


Figure 4-3 Typical Front Access Service Platform and Ladder Assembly

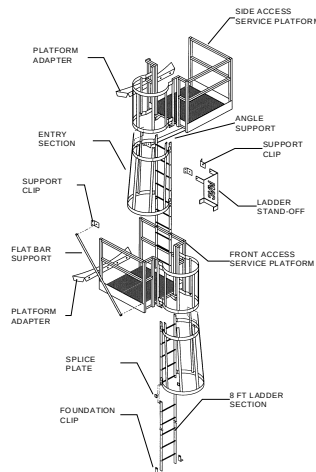


Figure 4-4 Typical Side and Front Access Service Platform and Ladder Assembly

Explosion Venting Venting Guidelines

This section is intended as a general guide only: For further information refer to NFPA Standard 68, "Explosion Venting" and consult with your insurance carrier.

- Explosion venting is **required** whenever the filter will process explosive dusts as defined by NFPA.
- Dust filters handling explosive dusts should be located outside of buildings wherever possible.
- Explosion vents must not be obstructed in any way and must be protected from snow/ice buildup. Explosion vents **must** be oriented so that flame, explosive gases, or flying material **cannot** injure personnel or damage property.
- Dust filters inside of buildings should be located next to an exterior wall; the explosion vent(s) **must** be ducted to the outside of the building. Vent ducts must be kept as short and straight as possible, avoiding bends. Such ducts must be capable of withstanding a pressure at least as high as that expected to develop inside the filter itself in the event of an explosion. Ducts increase internal pressures inside the filter, and special reinforcement of the filter may be required. Consult MAC Equipment, Inc. Engineering Department regarding your specific application.
- Any duct will decrease the effectiveness of the vent.

Explosion Vents-General

Explosion vents are available from MAC Equipment Inc., in either PVC or domed rupture panel styles as part of the filter system. The PVC style vent functions by breaking the plastic bolts holding it to the filter housing. The rupture panel style functions by bursting the panel itself. Explosion vents are installed **after** the filter unit is assembled on its support structure.

Installing MAC PVC Style Vents

The filter is shipped with the PVC style explosion vent panel **temporarily** mounted with four steel bolts. The vent must be disassembled and re-installed using the plastic bolts provided. Refer to Figure 4-5.

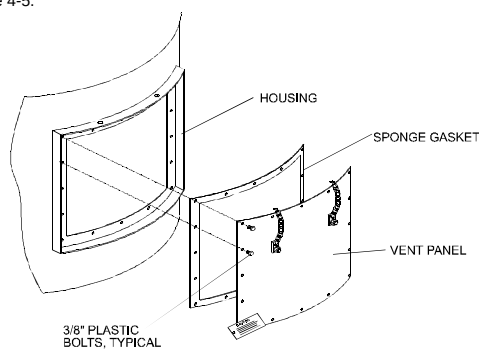
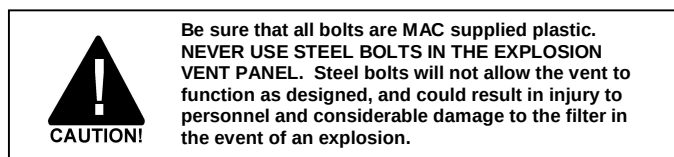


Figure 4-5 Typical PVC Style Explosion Vent

1. Remove the four steel bolts and discard. Remove the vent panel.
2. Seal the housing with the 1/8" thick x 1-1/2" wide sponge gasket, supplied.
3. Bolt vent panel in place with 3/8" plastic bolts provided by MAC Equipment, Inc. Torque to approximately 30 inch-pounds.
4. Make sure that the two retaining chains are tightly fastened to the housing and to the vent panel.



Installing Domed Rupture Panel Style Vents

The installation of the rupture panel style vent should be performed by two people. Refer to Figure 4-6 below.

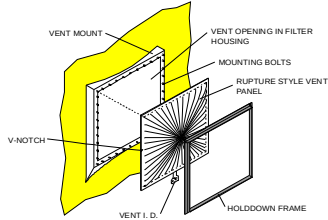


Figure 4-6 Typical Rupture Style Explosion Vent

1. Remove the hold-down frame from the vent mount on the side of the filter.
2. Carefully remove the rupture style vent panel from the crate (**CAUTION!** Edges of the vent panel are sharp!) Avoid excessive flexure of the vent.
3. Place the vent panel over the protruding bolts in the housing wall. The vent panel must be oriented correctly. The panel ruptures on three sides and hinges on the fourth. The hinge side is indicated by a v-notch in the edge. Place the panel with the v-notch to the left and the I.D. tag at the bottom as shown in Figure 4-6. The dome must protrude outward as shown or the panel will not function.
4. Place the hold down frame over the bolts, making sure that an even pressure is brought to bear on the panel.
5. Tighten nuts evenly and use an alternating pattern to prevent damage to the vent panel. Tighten nuts to 20-25 ft. lbs. of torque. It is not necessary to use an excessive amount of pressure to clamp the panel securely.



Excessive tightening may damage fasteners or the explosion vent panel.

Ductwork and Accessories

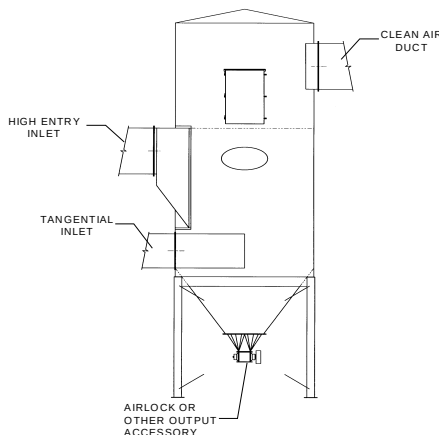


Figure 4-7 Location of Ductwork and Accessories

1. Connect the inlet duct to the high entry inlet or tangential inlet on the filter.
2. Connect the clean air duct to the exhaust located at the top of the filter housing. Ductwork must be constructed to withstand the system design pressure. The ductwork must be independently supported; the MCF filter is **not** designed to support ductwork.
3. Attach any auxiliary equipment (such as an airlock or screw conveyor) to the discharge flange of the hopper.

Discharge Auger Assembly

The discharge auger assembly includes transitions with bolted inspection opening, discharge auger and optional airlock, and is typically shipped assembled. Install the assembly after the filter has been erected on its support structure

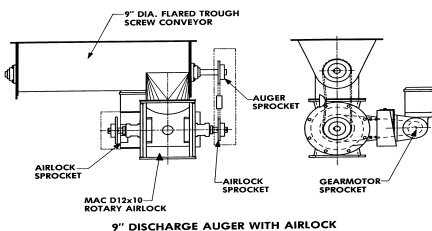


Figure 4-8 Discharge Auger Assembly

To install the auger assembly:

1. Determine the correct orientation for the auger discharge. The transition may be rotated through 360 degrees in 15 degree increments.
2. Apply a bead of silicone caulk to the transition flange and bolt it to the hopper flange with 3/8-16UNC x 1-1/4 bolts with lock washers.

Pump Package

Pump package is shipped without lubricant. Refer to lubrication section under Start-up and Operation.

To install the pump package:

1. Locate package on concrete pad with pressure (discharge) side to left of ladder when facing filter.
2. Air supply line connection is located to left side of and above service door.
3. Install piping from pump discharge silencer to filter (piping is normally not supplied by MAC). Be sure that there is no foreign material in the piping. Dirt and scale will effect the operation of the filter cleaning mechanism.

- 38 POSITIVE DISPLACEMENT PUMP
- 39 MOTOR
- 40 DRIVEN SHEAVE
- 41 BELTS
- 42 DRIVER SHEAVE
- 43 OUTLET SILENCER
- 44 PRESSURE GAUGE
- 45 UNITARY BASE
- 46 INLET FILTER

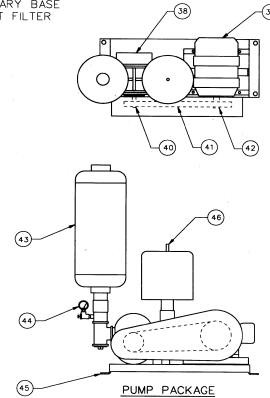


Figure 4-9 Pump Package

Electrical Controls and Wiring

Electrical Connections

Distributor arm: Drive is a 1 HP motor (refer to label on motor for power requirements). It is accessible to conduit through a 1" NPT coupling located in filter sidewall above the service door. In high temperature units operating above 165°F the drive and motor are located outside of the unit.



The distributor arm rotation must be clockwise when looking down from above. Reverse operation could result in damage to the index mechanism or "Backing-off" of threaded components.

Pump package: Motors vary from 2 HP to 15 HP, all are 230/460 volt 3 phase 60 Hz unless specifically ordered otherwise.

Airlock: See airlock service manual.

Fan: See fan service manual.



Only trained and authorized persons should be permitted to service or maintain electrical components. It is the buyer's/installer's responsibility to ensure that all applicable electrical codes are met.

NOTE: The motors should be interlocked such that they start and shut-down in the following sequence:

Start-up:

1. Airlock and discharge auger.
2. Distributor arm drive and pump package.
3. Main system fan.

Shut-down:

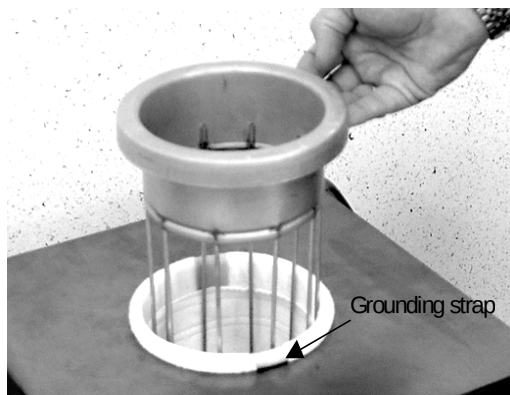
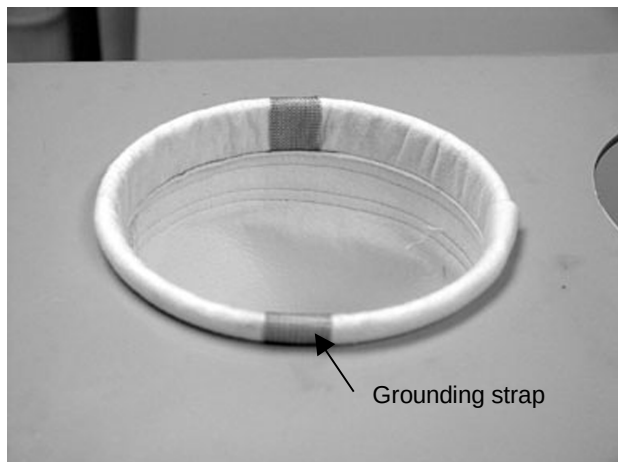
1. System fan.
2. After variable time delay (0-15 min.) pump package and distributor arm drive.
3. Airlock and discharge auger.

Optional MCF filter control panel is designed to make the task of start-up and shut-down simpler, faster, and more efficient. The control logic is such that all motors are started in order by pushing the system start button and will stay running until one of the following occur:

1. The stop button is depressed and the system goes into a shut down period. The main fan stops immediately and the rest of the system continues to run for an adjustable time before stopping.

Section A: Bag Installation

The two grounding straps at the top of the bag are intended to ground the cage to the tubesheet. Ensure that the hole is cleaned to remove dust and corrosion buildup. Install bag in hole and insert cage.



Section B: Verification of Proper Grounding

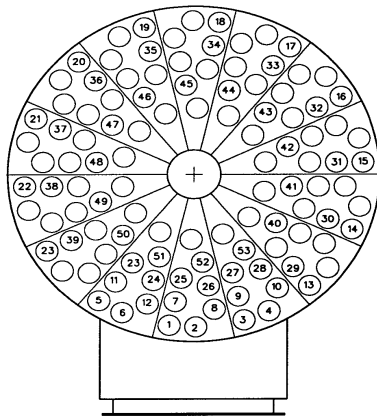
Proper installation must be confirmed by testing to verify 1×10^6 (1 megohm) maximum resistance at 500 volts between cage and tubesheet (cell plate).



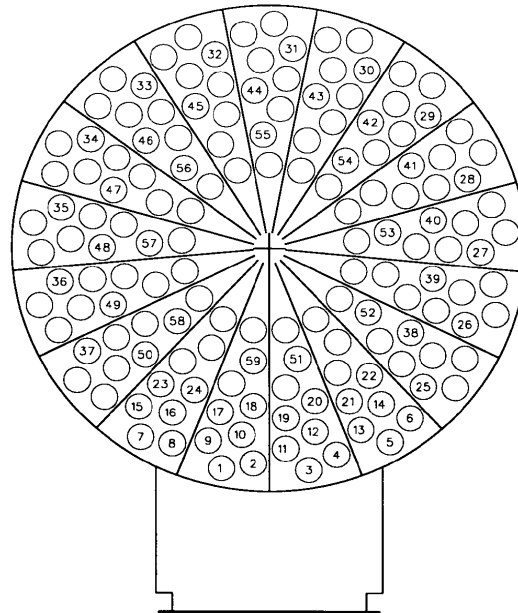
Top load collector: testing resistance between cage and tubesheet.

In addition to the proper installation and grounding of bags and cages, the end user should select an appropriate filter media for use in bags. Refer to the National Fire Protection Association (NFPA) "Recommended Practice on Static Electricity," NFPA 77-2000 edition for more information (www.nfpa.org).

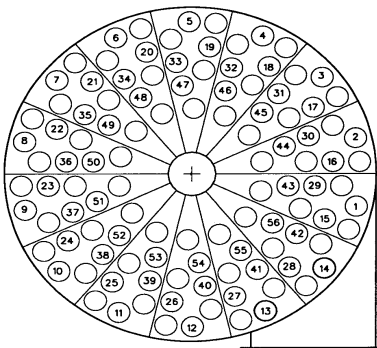
For blank-out placement, see the illustrations on the following pages. The blank-out plugs must be pressed in the tube sheet hole so that its flange is flush on the tube sheet. On larger MCF units, follow the general pattern of the smaller units. Locate the plugs in the numbered priority as shown.



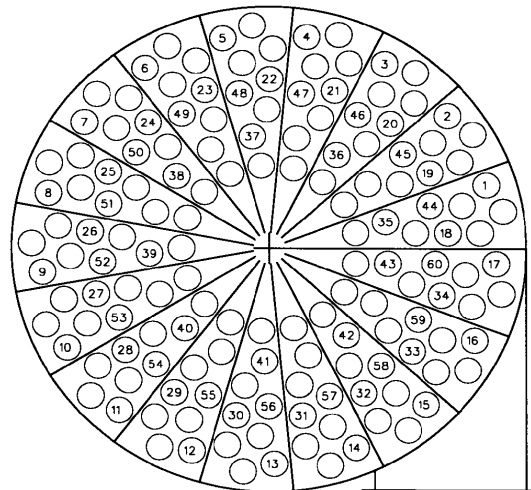
**MCF 112
HIGH ENTRY INLET**



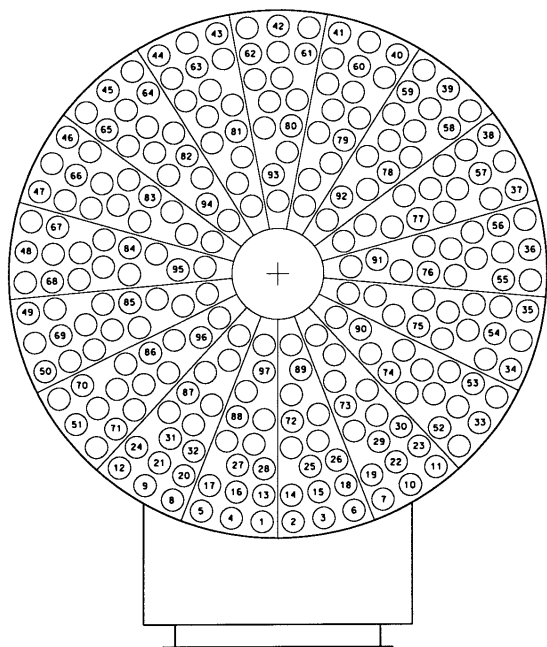
**MCF 153
HIGH ENTRY INLET**



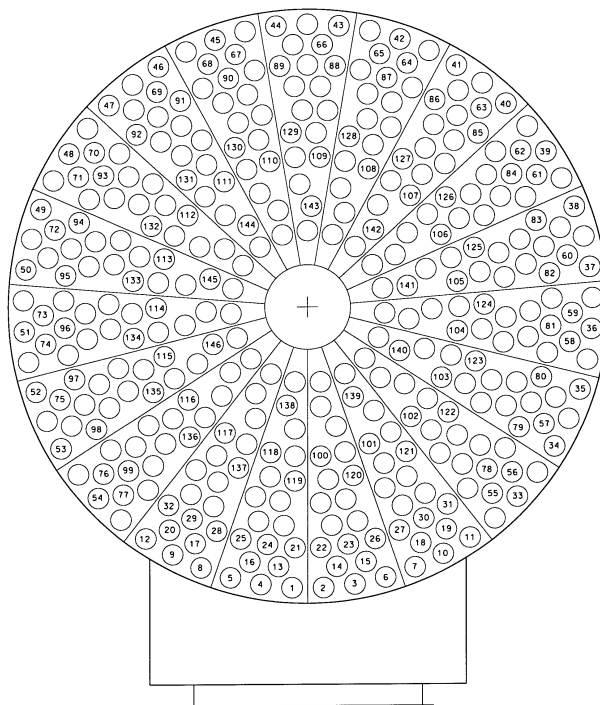
**MCF 112
TANGENTIAL INLET**



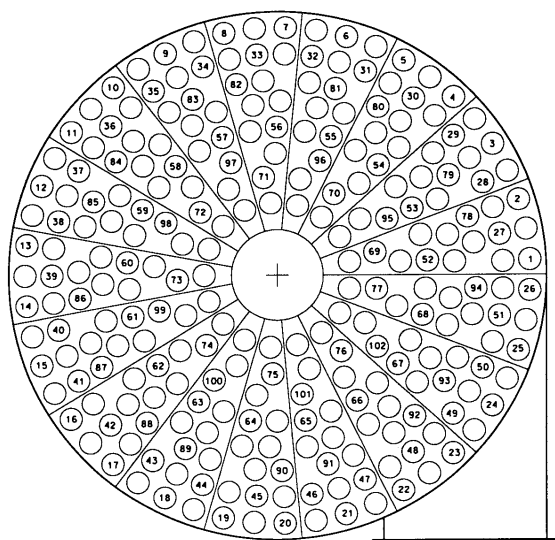
**MCF 153
TANGENTIAL INLET**



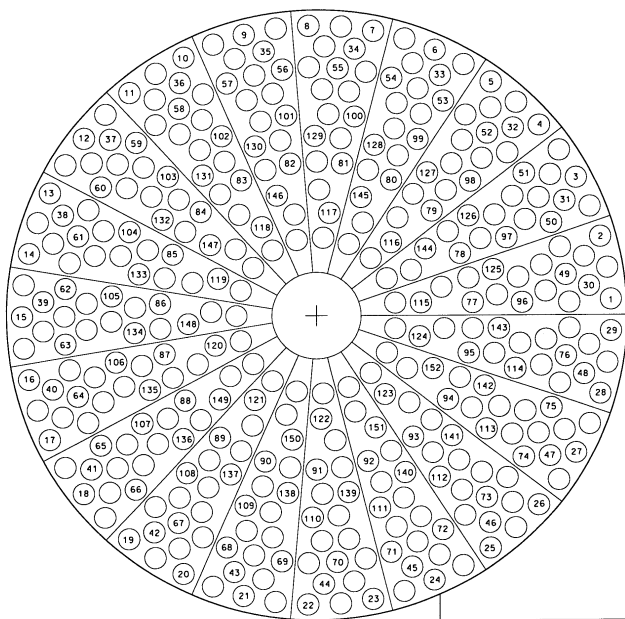
**MCF 255
HIGH ENTRY INLET**



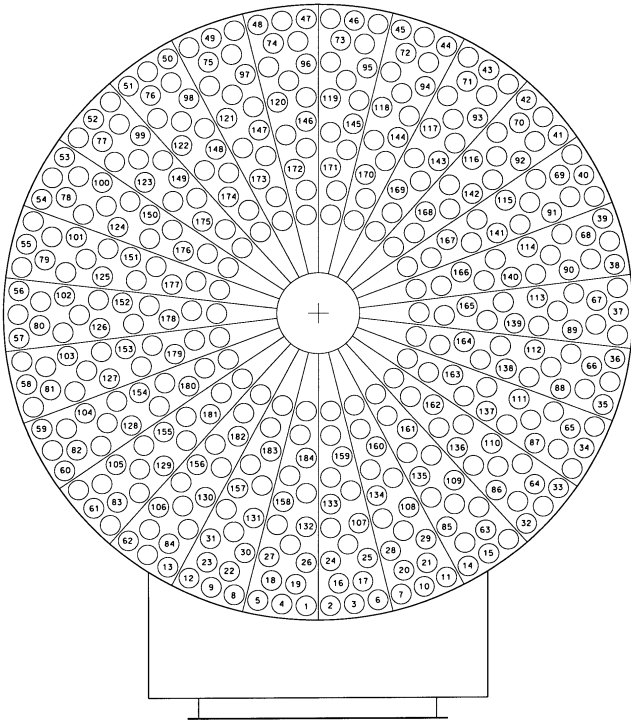
**MCF 361
HIGH ENTRY INLET**



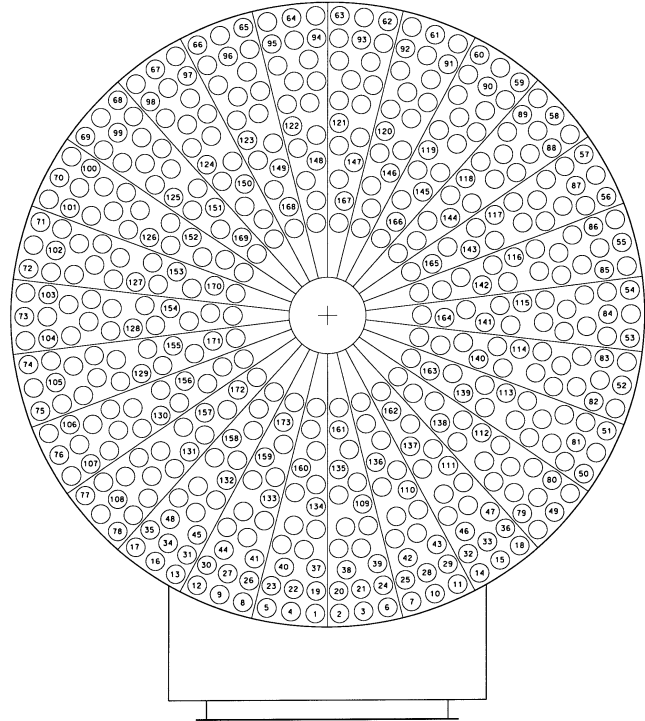
**MCF 255
TANGENTIAL INLET**



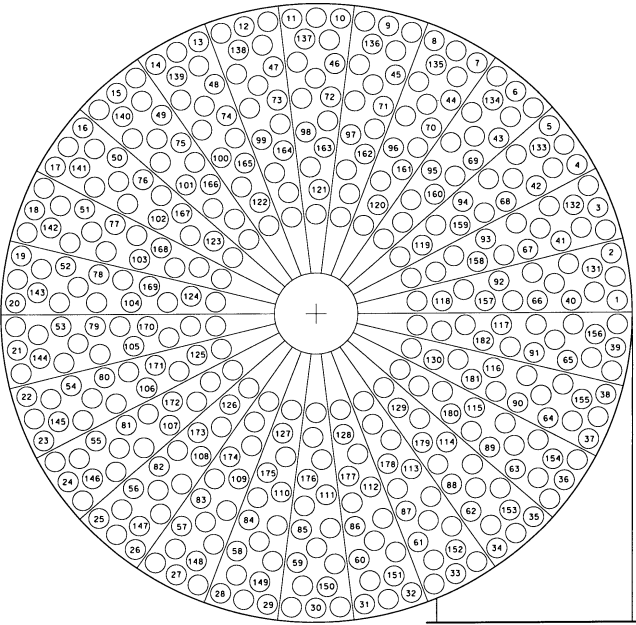
**MCF 361
TANGENTIAL INLET**



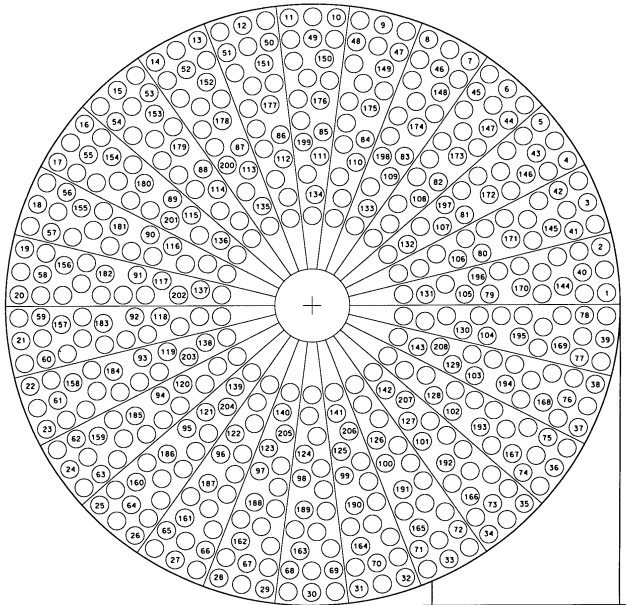
**MCF 416
HIGH ENTRY INLET**



**MCF 494
HIGH ENTRY INLET**



**MCF 416
TANGENTIAL INLET**



**MCF 494
TANGENTIAL INLET**

SYSTEM START-UP AND OPERATION

The following inspection should be made before the initial start-up of the system and for normal operation thereafter.



Disconnect and properly lockout-tagout all electrical connections before performing any inspection procedures.

Cleaning Mechanism

1. Gear reducer is shipped dry. Install proper level of lubricant. Refer to the Lubrication Fluids Table for the proper lubricants required for this units.
2. Bearings are pre-lubricated and should not require lubrication at start up.
3. Drive coupling (Item 4) ships disengaged. Loosen set screws and slide couplings together. Tighten set screws. Refer to Figure 9-1 for illustration.
4. Jog the drive motor on and off quickly to check direction of rotation. The proper direction of the cleaning arm is CW as viewed from the top. Listen for sounds of unwanted mechanical contact.

Pump Package

1. Pump package is shipped dry. Install proper level of lubricant. Refer to the Lubrication Fluids Table for the proper lubricants required for this units. Refer to the maintenance section for procedures and quantities of lubricant. Further information is also contained in the pump package manual.
2. Remove belt guard and check belts for alignment and tension.
3. Rotate pump by hand to check freedom of rotation and binding.
4. Jog the drive motor on and off quickly to check direction of rotation. The proper direction is indicated by a decal on the drive guard. Listen for sounds of unwanted mechanical contact. If pump knocks do not start. See Trouble Shooting Guide.
5. Replace guard.
6. Start pump and filter and operate for 15 minutes, check for hot spots, noise and other indications of interference. Allow pump to cool to room temperature and recheck oil level.
7. Start pump and filter. Observe operation for the first hour.
 - a. Monitor pressure at pump outlet, it should be 6 to 8 PSIG when the filter pulses.
 - b. Check amp draw in the motor. See motor name plate for rating.

Pump Operation

1. Check oil level daily for first week of use, then weekly thereafter.
2. Check intake filter weekly, or more often if dust conditions are severe. Clean as required. Filter element is a dry type element with a 1/4" polyester foam pre-filter. Pre-filter may be cleaned by washing with mild soap and warm water.
3. Check the drive belts tension after 24 hours of operation, then check periodically. Tighten if necessary.

Filter Bags

1. Check filter bags for proper installation.
2. When the MCF Filter is started up in cold weather or if the unit is handling high temperature gases there is a danger of condensation forming on the filter bags and inside the housing. This is a very undesirable situation and can be avoided by preheating the filter for about 30 minutes. Preheating is accomplished by starting the fan and filter and allowing it to run without any dust loading. Before doing this the MCF filter cleaning mechanism and pump package should be run alone with the main exhaust fan shut down for about 10 minutes to clean and remove all of the dust cake on the bags.
3. Dust emission may occur from exhaust at start up but it should disappear after a new dust cake is formed on the bags. This should only take a few hours. If the dust emission persists, the filter bags should be rechecked to be certain that they seat properly in the tube sheet.

System Parameters

Use this page to record the operating conditions of the system once start-up is complete and you have made the final adjustments. You will find this information very valuable for future reference when troubleshooting the system or when monitoring its performance.

DUST MATERIAL: _____

DUST PARTICLE SIZE: _____

FILTER MODEL: _____

FILTER S/N: _____

AIR/CLOTH RATIO: _____ AIR FLOW _____ CFM

PHOTOHELIC GAUGE SET POINTS: (if provided)

High: _____ "H₂O Low: _____ "H₂O

DIFFERENTIAL PRESSURE: _____ "H₂O

(after the filter has stabilized)

FAN MODEL/MANUFACTURER: _____

FAN S/N: _____

FAN RPM: _____

FAN DESIGN: _____ CFM @ _____ "SP, _____ BHP

Notes:

High Temperature Units

For MCF units encountering high temperatures in excess of 400 degrees F. the cleaning arm and pump should be operated during the preheat cycle. This will prolong the life of temperature sensitive materials in the cleaning mechanism by cooling them.

NOTE: AIR DIVERter VALVES should be in the closed (clean) position during preheat cycles.

MAINTENANCE

It is recommended that one individual be assigned to monitor the operation of the dust-collection system. The individual assigned should have maintenance manuals and manufacturer's documentation for all components readily available. He(she) should be thoroughly familiar with the manuals so as to be able to pinpoint trouble should it occur. The individual responsible for the system should follow a regular schedule of inspection and maintenance. The exact schedule will depend on the particular system and the number of hours it operates per day or week. A typical maintenance schedule is shown below.

Sample Maintenance Schedule



Disconnect and properly lockout-tagout the electrical and compressed air service before performing any maintenance or service procedures on the filter.

Weekly

1. Check and record magnehelic (or photohelic) gauge readings on all filters. Adverse operating conditions can be detected by a change in pressure drop.
2. Check for dust in clean air outlet from filter.
3. Check filter hoppers for continuous discharge of dust.
4. Check fan and motor bearings for excessive heat or vibration.
5. If pressure pneumatic conveying equipment is used to dispose of dust, check the positive displacement pump for vibration, overheating, and proper lubrication. Also, compare reading on the pressure gauge with previous readings. Clean air-inlet filter or replace as necessary. It is important to follow the manufacturer's recommendation on equipment of this nature.
6. Check explosion vent(s) (if provided) for damage (broken bolts or damaged panel).

Monthly (or at manufacturer's recommended intervals)

1. Check the filter bags for signs of excessive wear or damage.

Six Months

1. Check for evidence of moisture or dust buildup inside the filter housing.
2. Check oil in all gear motors. Do not overfill.
3. Check belt tension on all V-belt drives.

Bag Replacement

The filter bags are the heart of the filter and need a program of inspection, cleaning, and replacement to maintain high operating efficiency.

1. Shut down the system, and lockout-tagout the electrical and compressed air service.
2. Remove cage and inspect for rust or damage and replace if necessary.
3. Remove the bag and inspect for excessive wear, replace if necessary.
4. Reinstall clean filter bags as described in the Installation section.

Bag Cleaning

Natural fiber fabrics (wool or cotton) are subject to shrinkage when wet with water. These fabrics must be dry cleaned. Synthetic filter fabrics (Orlon, Dacron, Nomex, polypropylene, and Teflon) should also be dry cleaned.

1. Thoroughly vacuum clean the filter bags to remove the bulk of the dust.
2. Dry clean the bags using a standard dry cleaning procedure. Use pure dry cleaning solvent. Do not use dry cleaning detergents and/or additives that require the addition of water, as these may cause fabric shrinkage.
3. Dry the bags. Drip drying is the recommended drying method. Tumble drying, if used, must be done at low temperatures.

Industrial dry cleaning establishments are available in many cities. These companies specialize in filter bag cleaning and will normally provide the most satisfactory results.

Lubrication

Gearmotors

Located on distributor arm drive and optional airlock drive.

Refer to the Lubrication Fluids Table for lubricants. Refer to the Lubrication Schedule for recommended replacement times. Do not use lubricants containing sulfur and/or chlorine extreme pressure additives which are corrosive to worm gear bronze.

Motors

Standard motors are permanently lubricated and require no further attention.

Pump

The positive displacement pump is shipped dry. At the gear end the timing gear teeth are lubricated by being partially submerged. The gear teeth serve as oil slingers for gear end bearings. At the drive end the bearings are grease lubricated.

Filling Procedure

Remove square head vented oil fill plug on gear end. Remove oil level plug located in head plate. Fill gear case until oil drips out of the oil level hole.

Add fresh oil as required to maintain proper oil level. In typical 8 hour per day operation, oil should be drained, flushed and replaced every 6 months, more often with increased operating time or severe conditions.

Bearings on drive end of blower require grease lubrication initially and every 2 months of operation in typical 8 hour days, more often with increased operating time or severe conditions.

Recommended Oil & Grease

1. Under ambient temperature operating conditions use any good quality SAE 40 non-detergent oil.
2. In cold climates use SAE 20 during the winter months.
3. Use No. 2 bearing grease in all climates.

NOTE: For additional information on positive displacement pump consult the manufacturers manual included with pump package.

Lubrication Fluids Table

EQUIPMENT	AMBIENT TEMPERATURE LUBRICANT T<125°F	MEDIUM TEMPERATURE LUBRICANT 125<T<225 °F	HIGH TEMPERATURE LUBRICANT 225<T<475°F
Airlock gear reducer	SEE AIRLOCK MANUAL	NOT RECOMMENDED	NOT RECOMMENDED
Positive displacement pump	SEE PUMP MFR LITERATURE	NOT RECOMMENDED	NOT RECOMMENDED
Cleaning Arm Drive	Hub City Gear Lubricant GL-150 8-58-00-01-010	Hub City All-Temperature Synthetic Gear Lubricant 8-58-00-01-011	NOT RECOMMENDED
Cleaning Mechanism Lower Bearing	NO 2 Bearing grease	DOW BR2-PLUS MULTIPURPOSE E.P. GREASE	DOW 41 EXTREME HIGH TEMPERATURE GREASE

Lubrication Schedule

COMPONENT TO BE SERVICED	DAILY SERVICE		
AMBIENT OPERATION	8 HOURS	16 HOURS	24 HOURS
PUMP	26 WEEKS	13 WEEKS	8 WEEKS
PUMP BEARINGS	9 WEEKS	4 - WEEKS	3 WEEKS
GEAR BOXES (INTERNAL)	6 MONTHS	22 WEEKS	14 WEEKS
BEARINGS	YEARLY	8 MONTHS	6 MONTHS
HIGH TEMPERATURE OPERATION 150 TO 250°F			
GEAR BOXES (INTERNAL)	16 WEEKS	12 WEEKS	8 WEEKS
GEAR BOXES (EXTERNAL)	6 MONTHS	22 WEEKS	14 WEEKS

BEARINGS	16 WEEKS	12 WEEKS	8 WEEKS
HIGH TEMPERATURE OPERATION 250 TO 450°F			
GEAR BOXES (INTERNAL)	12 WEEKS	8 WEEKS	4 WEEKS
GEAR BOXES (EXTERNAL)	6 MONTHS	22 WEEKS	14 WEEKS
BEARINGS	12 WEEKS	8 WEEKS	4 WEEKS

MCF Cleaning Mechanism

How the Cleaning Mechanism Works

The success of the MAC MCF Filter centers around its positive, controlled, cleaning mechanism. Every bag is cleaned the same number of times, with the same amount of cleaning air. Bag cleaning is accomplished using medium pressure (6-9 psig) reverse air, in a completely controlled manner.

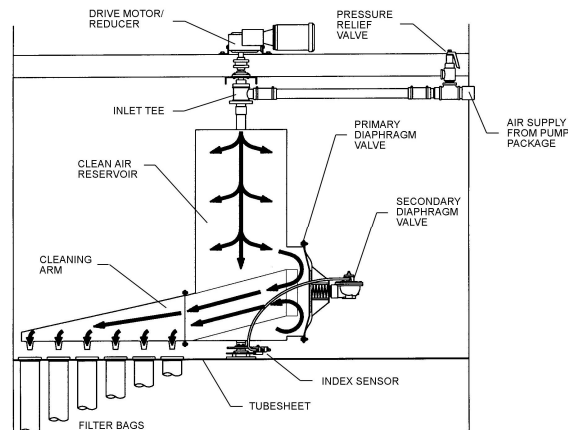


Figure 6-1 Typical Cross Section of Cleaning Mechanism.

The cleaning, or distribution arm, is formed to correspond with the pie shaped sections of the tube sheet. The tube sheet is the punched hole plate where the filter bags are attached. As the distribution arm rotates (clock-wise, looking down on tube sheet), pressure builds in the cleaning air reservoir. As the arm passes over each fifth tube sheet segment, the pneumatic index sensor mechanism vents the pilot air line of the secondary diaphragm valve. This causes a chain reaction; the secondary diaphragm opens, and the large primary diaphragm rapidly opens off of its seat, allowing compressed air from the air reservoir to flow into the distribution arm. Venturi nozzles, located on the under side of the distribution arm, are positioned over the filter bag centers as cleaning air is released into the bags.

Venturi Nozzles
Rolled Flange Top cage
No Tool Snap Ring Bag and Cage Assembly



Figure 6-2 Typical Distribution Arm Detail

Adjustment

Do not enter the cleaning mechanism compartment when the cleaning arm and /or the main exhaust fan are rotating or energized.

! DANGER!



Remotely started equipment can operate without warning!!!

Before attempting to make any adjustments on the cleaning mechanism, read and understand all instructions thoroughly. The motor powered, rotating arm has sufficient power to cause severe injury and the close confines of the compartment limits personnel movement. Read and understand the other safety information contained in this booklet before attempting any maintenance or adjustments.

In order for the cleaning mechanism to function properly, the cleaning "pulse" must occur as the venturi nozzles pass directly over the centerlines of the individual filter bags. Adjustment of the index sensor assembly clamp controls cleaning air pulse timing. Refer to the illustration at right and item number 19 in Figure 9-1 on the cleaning mechanism illustration located in section 9005. This mechanism is "rough" timed at the factory, but requires fine tuning once the baghouse is installed in the field. All models of MCF baghouses, from the Compact to the large Panelized units, utilize the same method and similar parts for initiating the cleaning pulse. Timing adjustment procedure is the same for all units.

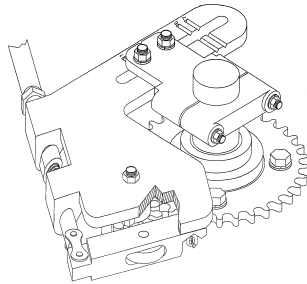


Figure 6-3 Typical MCF Index Sensor



Be sure the main system fan has been de-energized and locked out, before opening the door of the cleaning mechanism compartment. **DO NOT ENTER** the compartment, observe operation of the rotating cleaning arm and timing of the cleaning pulse while standing **OUTSIDE** the compartment. Be extremely careful while operating the arm when the access door is open. When making adjustments, shut off and lockout all power to the rotating arm, system fan, and positive displacement blower before entering the compartment.

Determining if the index sensor assembly needs adjustment, requires observation of the operating cleaning arm with the positive displacement pump running. Observe the position of the distribution arm nozzles when the mechanism pulses. Observe all nozzles because it is possible for some nozzles to line up while others are misaligned. See the tube sheet illustration.

How The Index Sensor Assembly Works

The index sensor assembly serves two simple functions. (1) blocks off the pilot air line to the secondary diaphragm valve, while the cleaning air reservoir builds up pressure and (2) vents the pilot air line, opening the secondary and primary diaphragms, allowing compressed air flow to the venturi nozzles. See the illustrations at the beginning of this section for specific cleaning mechanism arrangements of the three major MCF collector variations. A stationary index sprocket is mounted over the reservoir shaft flange bearing (bolted directly to the tube sheet), and this fixed sprocket is positioned just below the rotating cleaning air reservoir (tank). The adjustable index sensor bracket clamps to the rotating pivot shaft of the tank. Rotation of the tank shaft causes the index cam sprocket to rotate. As the index cam sprocket actuating lobe contacts the roller wheel the rocker arm pulls the plunger from its seat releasing the air that allows the diaphragm valves to open and vent, permitting rapid air flow to the cleaning arm nozzles. When the plunger return spring pushes the plunger back against its seat the PD pump air pressure resets (closes) the diaphragm valves and pressure begins to build in the cleaning air reservoir tank. This cycle repeats as the index sensor passes over every fifth, pie-shaped tube sheet segment.

Changing position of the index sensor bracket, relative to the stationary index sprocket, changes the timing of the back-flushing cleaning air. Shifting the bracket opposite to the cleaning arm rotation, delays (retards) the pulse. Moving the bracket, in the same direction the arm turns, advances the pulse firing.

Adjusting MCF Filter Index Sensor Timing (MCF 112 through MCF 572)

Each MCF Filter is "rough" timed at the factory, and on start-up will need to be "fine-tuned" to achieve optimum operating efficiency.



For this procedure, it will be necessary to energize the distributor arm drive and the pump package. **DO NOT ENTER** the filter while the distributor arm is in motion. Lock out power to the main system fan and secure the service door in the open position. Fan can create enough force to close and hold the service door closed.

Start the distributor arm drive and the pump package. From the service platform, observe the location of the venturi nozzles when "firing" or pulsing takes place. Pulsing will occur over every fifth pie-shaped segment of the tube sheet. Refer to Figure 6-4 for the correct position of the distributor arm and its nozzles. In addition to watching the nozzles over the bags, timing arrows are located on the end of the cleaning arm and on the housing wall just inside the service door. The cleaning mechanism should fire when the two arrows are aligned and the nozzles are directly over the centerline of all of the filter bags. Observe the cleaning pulse for several rotations of the distributor arm. If the cleaning pulse does occur in the correct position, no further action is required. Proceed with normal filter start-up routine. If the cleaning pulse does not hit the bag centerline, the index sensor timing must be adjusted. This is done by moving the index sensor assembly in relation to the distributor arm.

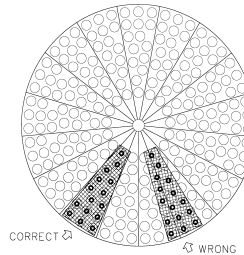


Figure 6-4 Typical Alignment Illustration

When the cleaning pulse occurs **after** the nozzles pass the centerline of the bags, the timing must be advanced. Loosen the two bolts in the clamp and move the assembly a small amount in the direction of rotation.

Repeat these adjustments as required to direct the cleaning pulse into the bag centerlines. Be sure to tighten the index clamp bolts after final adjustment.

If the index sensor is grossly out of time, it may be reset relatively easily:

1. Disconnect drive coupling on drive gear box allowing the distributor arm to swing freely.
2. Rotate the distributor arm to line up the arrow on the cleaning arm and the arrow on the housing wall. Block the distributor arm in this position.
3. Loosen the two index clamp bolts until the index sensor can be moved easily by hand.
4. With the nozzles on the distributor arm located directly over the bags, rotate the index sensor assembly clockwise (looking down on bags) until the actuator lobe on the cam is centered on the 1-1/8" diameter roller wheel and is causing the plunger to open from its seat. Tighten bolts on index sensor clamp.
5. Re-engage drive coupling, remove block from distributor arm, and check for proper firing sequence from outside the filter. Fine tune the adjustment as previously directed.

NOTE: If attempts at aligning the cleaning arm have been unsuccessful with this method, disconnect power to the pump and the cleaning arm. Remove the drive coupling. Have one person start the pump while another person is at the plenum access door. The cleaning arm should not be rotating. Enter the filter plenum and rotate the arm by hand. Observe where the firing takes place. Turn off the pump and adjust the index sensor in the direction required as recommended previously. Repeat as needed to fine tune the adjustment.



If the pump runs very long in this state the relief valve will open and there will be a very loud hissing noise from the pump area. This is normal but ear protection is recommended for the person near the pump. Watch the pressure gage on the pump and do not allow it to exceed 15 psi or damage to the equipment may occur. This will not happen if the relief valve is working properly.

Replace Large Diaphragm

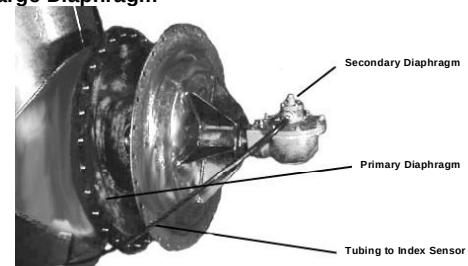


Figure 6-5 Typical MCF Larger Diaphragm Details

1. Lock out all power before entering filter.
2. Disconnect 1/2" bleed line at secondary valve head.
3. Remove nuts around large valve head and remove it. Be careful of large diaphragm spring to avoid dropping it down a bag.

4. Remove old diaphragm assembly. Some older MCF Models, have fabricated diaphragms which require a rebound cushion on the valve head. New MCF Models have one piece molded diaphragms that do not require this cushion ring. This ring should be removed when upgrading your filter with the molded diaphragm.
5. Clean flanges on tank and valve head. Apply a thin, even coat of silicone caulk to both flanges.
6. Place the new diaphragm on the studs with the side of the diaphragm marked 'tank side' towards the tank.
7. With diaphragm spring in place in valve head, place valve head on studs. Be sure that secondary valve is oriented correctly (exhaust points down).
8. Tighten all nuts until snug against the valve head.
9. In an alternating pattern, torque all nuts to 28 foot/pounds.
CAUTION: To insure a proper torque reading, move the torque wrench in a slow and smooth manner (Do not jerk the torque wrench).

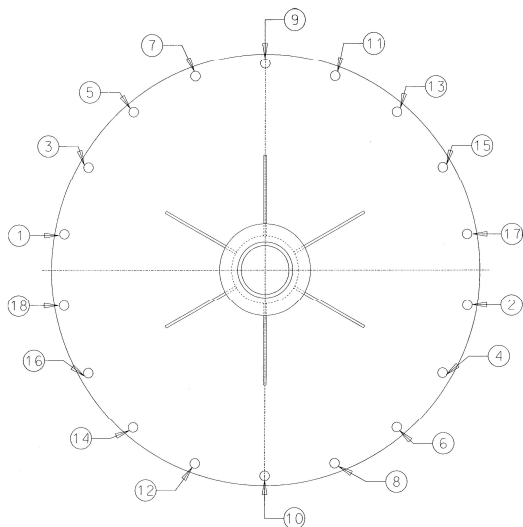


FIGURE 6-6 Typical tightening sequence.

10. Re-attach 1/2" line.

CAUTION: Torque all nuts to 28 foot/pounds to reduce the risk of fatigue failure. By pre-loading the bolts to 28 foot/pounds, the alternating stress exerted by the diaphragm firing on the bolts will be kept to a minimum.

Replace Shaft Seals On Air Inlet Tee

1. Lock out all power before entering filter.
2. Loosen hose clamps on the air supply line and remove it.
3. Disconnect the drive coupling between the gear reducer and the tank shaft.
4. Tie off the tank to the filter housing at the rings provided and place blocks under the ends of the cleaning arms to support the assembly.
5. Remove four bolts holding motor and reducer plate to channels and slide it over on the channels. Use clamps to secure plate to channel temporarily.
6. Turn the lower drive plate (below channels) 90° and lift the drive plate and shaft out of the tank.
7. Loosen the shaft collar directly above the inlet tee and slide it off the tank.
8. Slide the air inlet tee off the tank shaft.
9. Remove old quad rings (2) and install new set.
10. Slip tee back on shaft with light coat of grease.
11. If tee still appears to be loose then bushings need replaced. This can be done by removing tee, and threading the bushings out of the tee. NOTE: Top bushing is right-hand thread and bottom bushing has left-hand thread. Left hand thread bushing has notch in edge of bushing.
12. Reassemble by reversing the procedure above.

Replace Index Sensor

1. Lock out all power before entering filter.
2. Disconnect air line(s) from the sensor valve. High temp units have two lines attached to this valve.
3. Remove two 5/16" bolts clamping the assembly to the tank shaft and remove the assembly. Install new sensor assembly and replace air lines.

Magnehelic Gauge

1. Most filters are designed to operate at a differential pressure of 3 to 5 inches of water. When starting a new filter the differential pressure may be less than 1 inch until a mat of dust begins to build on the fabric. Once the filter reaches equilibrium pressure, the magnehelic gauge becomes an indicator of the operation of the entire system. So long as the gauge reads between 3 and 5 inches of water, the system will be delivering design volume flow.
2. When differential pressure exceeds the upper limit, the filter should be checked for malfunction. (See Troubleshooting Section) If none, is found, the excessive pressure means the bags should be cleaned or replaced. Normally, the bags should not require attention until after many months of operation.
3. When the filter differential pressure falls below the lower limit, the system, again, should be checked for malfunction. (See Troubleshooting Section).

GOYEN CONTROLS

TECH SPEC CAS-1 "T" SERIES DIAPHRAGM VALVES

The ¾" "T" series was the first Goyen valve to be offered to the industry. The series has now grown to include 7 sizes, ranging from ¾" (20mm) up to 3" (76mm).

All of these valves have right angle bodies, as the 90 deg. angle between inlet and outlet is considered a most suitable configuration for dust collector applications. The design offers ease of installation, low restriction to air flow, and so provides an excellent cleaning pulse.

The valves can be operated by either integral pilot solenoids (CA models) or remote pilot solenoids (RCA models).

CONSTRUCTION

Body and cover, are pressure diecast aluminium.

General purpose diaphragms are made from a Buna N elastomer, reinforced with nylon mesh, and are suitable for temperatures ranging from 180 deg. F (82 deg. C) down to -40 deg. F (-40 deg. C.) High temperature diaphragms are made from reinforced Viton, and are suitable for temperatures up to 450 deg. F (232 deg. C.) All seals are designed to meet the same operating criteria.

SPECIFICATION

Pilot Connections - ⅛".

Exhaust Connection: Tapered Pipe Threads 20T - ⅛", 25T - ¼", 35/45/50/62T - ⅜", 76T - ½".

Maximum working pressure: 860Kpa (8.6 Bar) (125 psi) Recommended working pressure: 760Kpa (7.6 Bar) (110psi)

Recommended pilot for RCA models: RCA3D2T

ELECTRICAL

Solenoid coil on CA models. Type QR or QD

Protection Class: QR - Nema 4, IP65 - DIN Socket
QD - Nema 1, IP31 - Conduit thread

STANDARD VOLTAGES AVAILABLE ARE

100/120 Volt 50/60 Hz.

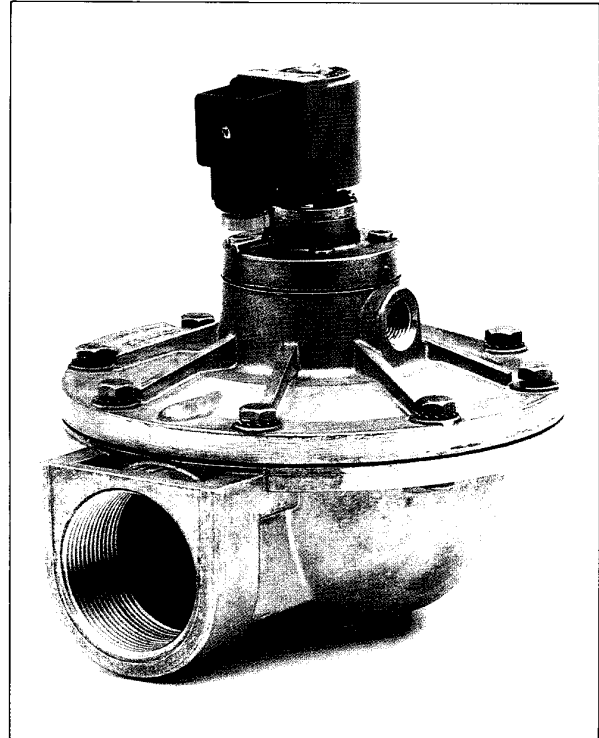
200/240 Volt 50/60 Hz.

24 Volt DC.

SPARE PARTS

Part numbers of diaphragm repair kits are shown in Table for both standard (Buna-N) and high temperature (Viton) elastomers.

Spare parts kits for pilot solenoid valves consist of ferrule tube, plunger and spring. The part numbers for these kits are M1131B (Buna-N) and M1167B (Viton). These kits service all CA valves, AC or DC voltages.



ORDERING

When ordering "T" Series valves, the following need to be specified:

- valve size (diameter)
 - CA or RCA
 - coil type, voltage, Hz for CA models
- A typical valve might be specified as follows:
CA40T-QR-240/50

DIAPHRAGM VALVES

... with integral pilot control (CA)

... for remote pilot control (RCA)

Model	Pipe Size	ORIFICE		Cv Factor	REPAIR KITS	
		Inches	mm		Buna N	Viton
CA/RCA 20T*	¾"	¾"	20	11.2	M1204B	M2082B
CA/RCA 25T*	1"	1"	25	25	M1183B	M1887
CA/RCA 35T*	1½"	1½"	40	42	M1581	M1761
CA/RCA 45T2	1½"	1½"	40	53	M2162	M2457
CA/RCA 50T	2"	2"	50	87	M1638A	M1157A
CA/RCA 62T	2½"	2½"	62	100	M1638A	M1157A
CA/RCA 76T	3"	3"	76	135	M1798	M1925

* Single diaphragm models

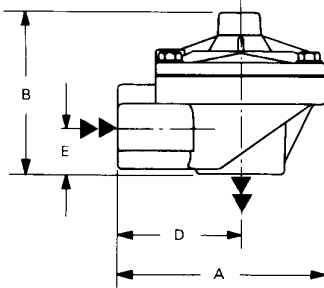
Kv = .86 Cv

"T" SERIES DIAPHRAGM VALVES

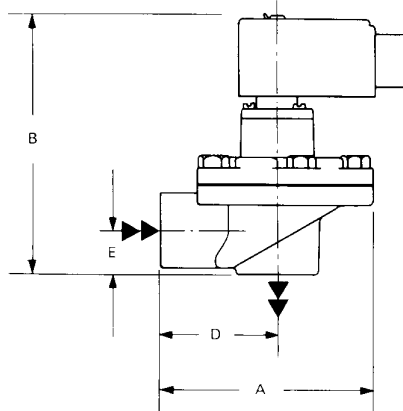
DIMENSIONS ... all diaphragm valve models

VALVE MODEL	ORIFICE		A		B		WIDTH		D		E	
	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm
RCA20T	¾"	20	3.97	101	2.97	75	3.44	87	2.19	56	.78	20
RCA25T	1"	25	4.13	104	3.03	77	3.25	83	2.50	63	.87	22
RCA35T	1½"	40	4.75	120.5	3.66	95	4.37	111	2.56	64	1.20	30
RCA45T2	1½"	40	5.41	138	4.72	125	4.96	126	2.93	75	1.28	32
RCA50T	2"	50	8.11	206	6.06	154	7.25	184	4.49	114	1.57	40
RCA62T	2½"	62	8.25	210	6.81	173	7.25	184	4.63	117	1.94	48
RCA76T	3"	76	8.63	219	8.00	203	7.88	200	4.69	119	2.50	63
CA20T	¾"	20	3.95	101	4.91	125	3.44	87	2.19	56	.78	20
CA25T	1"	25	4.13	104	4.95	125	3.25	83	2.50	63	.87	22
CA35T	1½"	40	4.75	119	5.75	142	4.37	111	2.56	64	1.20	30
CA45T2	1½"	40	5.41	138	6.71	175	4.96	126	2.93	75	1.28	32
CA50T	2"	50	8.11	206	8.15	204	7.25	184	4.49	114	1.57	40
CA62T	2½"	62	8.25	210	8.75	224	7.25	184	4.63	117	1.94	48
CA76T	3"	76	8.63	219	9.84	250	7.88	200	4.69	119	2.50	63
RCA25TD	1"	25	4.13	105	5.50	138	3.25	83	2.50	64	3.38	86

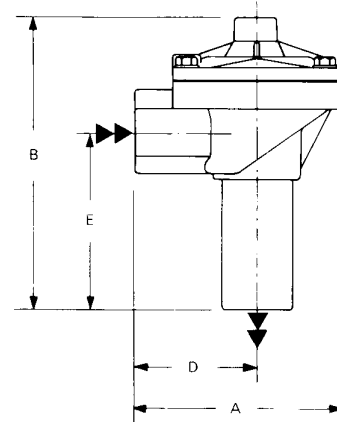
ALL RCA-T MODELS



ALL CA-T MODELS



MODEL RCA25TD



TROUBLESHOOTING

The items listed below are intended as a quick reference for common problems that may be encountered with a dust filter. If you are experiencing any difficulties not covered or have any questions concerning your MAC filter, contact your local MAC representative or MAC Equipment, Inc.



Disconnect and properly lockout-tagout the electrical and compressed air service before performing any maintenance or service procedures on the filter.

It is imperative that the control panel enclosure be secured at all times unless access is required.

Troubleshooting Filter Cleaning Mechanism

POSSIBLE CAUSE		SOLUTION
1. High differential pressure across tube sheet. (5" H₂O and rising)		
a) Cleaning pump not running.	•	See section on pump to determine fault.
b) Low pump pressure	•	Check gauge on pump, normal pressure is (6 to 8 psi) if low refer to pump troubleshooting guide.
c) Clogged or deteriorated gauge line	•	Clean or replace lines. If installation is several years old replacement of lines may be necessary.
d) Bad gauge	•	Check internal filter on differential pressure port on filter housing. Replace if blocked.
e) Bags blinding	•	Inspect bag dust cake. High humidity and condensation will cause dust cakes that are difficult to remove. Run filter with exhaust fan off and without dust load for 15 to 30 minutes until cake is removed.
	•	Preheat filter on start up to avoid condensation. If air stream is extremely humid then review application with MAC Equipment, Inc.
	•	If condensation is a recurring problem, start and operate the system with no dust load until the filter reaches ambient temperature. It may also be necessary to operate the system with no dust load for a time at shut down.
f) System air volume too high	•	Check air flow of system and compare with design values. If air flow is too high review application with manufacturer.
g) Dust particle size too small	•	Small particles (less than 10 microns) will affect efficiency of filter media. Analyze particle size distribution with original design parameters. If excessive amounts of small particles are present then review application with manufacturer.
h) Bag fit on cages too tightly	•	Check bag fit on cages with the pinch test. You should be able to pinch 1/2" of fabric at any position. Tight bags will not allow the bags to "flex" properly for cleaning. If bags are too tight replace them. Bags which have been cleaned or washed may shrink and must be checked for proper fit on cage.
i) Cleaning mechanism timing unsynchronized	•	Refer to maintenance section for correct timing adjustment
j) Cleaning mechanism malfunction.	•	Listen to filter for the distinct cleaning pulse. (3 to 7 sec cycle) If pulse is not heard see "Cleaning Mechanism Malfunction"

2. Low differential pressure. (less than 1/2" H₂O)

- | | | |
|----|---|---|
| a) | Check items 1a and 1b. | • Verify lines to magnehelic gauge are properly connected. |
| b) | Holes in bags. | • Replace worn bags. |
| c) | Incorrect bag installation causing leakage. | • Look for dust in clean air plenum. Refer to bag installation procedure. |

3. Cleaning mechanism malfunction.

- | | | |
|----|--|---|
| a) | Cleaning arm not running | • Check motor.
• Check power supply. Make necessary repairs to get motor running.
• Check shear coupling on drive shaft. Replace if needed and correct problem that caused shear. |
| b) | Leak in air line from secondary valve to index valve | • Repair or replace line. |
| c) | Index sensor malfunction | • Visually inspect for loose parts and wear. Remove sensor and bench test valve. Connect 7 psi air line to valve and manually actuate. Replace if plunger will not seal. |
| d) | Secondary valve malfunction | • Disassemble and inspect diaphragm for tears and wear. Replace if damaged. |
| e) | Primary diaphragm malfunction. | • Remove cover to diaphragm. Inspect for tears and wear. Replace if damaged. |

4. Poor bag life.

- | | | |
|----|-------------------------------|---|
| a) | Incorrect filter media. | • High temperatures, chemical content, and dust composition will affect bag life. |
| b) | Abrasion | • Poor inlet design practices such as high inlet velocities and elbows on the inlet can cause accelerated abrasion on bags. Consult MAC Equipment, Inc. for guidance. |
| c) | Damaged cages | • Damaged, corroded or bent cages can wear on bags. Replace cages. Coated or stainless steel cages are available. |
| d) | Moisture in air stream. | • Moisture will cause acids to form in some applications which weaken the filter media. Check moisture level and composition of dust and air stream. Consult MAC Equipment, Inc. for review of application. |
| e) | Excessive air to cloth ratio. | • Check air to cloth ratio and compare to original specifications. |
| f) | Improper cleaning. | • Review cleaning procedures. Improper cleaning can shorten bag life. |

5. Dust in exhaust air

- | | | |
|----|---|--|
| a) | Normal for start up period and new bags | • Allow filter to run for 48 to 96 hours. |
| b) | Holes in bags | • Replace worn bags |
| c) | Blank-out plugs installed incorrectly | • Check all blank-out plugs for tight fit. |

Troubleshooting Pump Package

POSSIBLE CAUSE		SOLUTION
1. Knocking		
a)	Unit out of time	• Reset timing per manufacturers manual.
b)	Housing distortion due to external strains from pipes and/or drive tension	• Relieve pipe loads on pump and adjust belt tension.
c)	Worn gears	• Replace timing gears per manufacturers manual.
d)	Worn bearings	• Replace bearings per manufacturers manual.

	e)	Worn bearing fit	• Replace bearing and/or head plate per manufactures manual.
2. Excessive temperature in blower.			
	a)	Too much oil in gear case or drive cover	• Reduce oil level to recommended levels.
	b)	Clogged filter or muffler	• Remove clog or replace component.
	c)	Worn impeller clearances	• Restore clearances per manufactures recommendations.
3. Impeller end or tip drag			
	a)	Incorrect clearances	• Restore clearances per manufacturers recommendations.
	b)	Case or frame distortion	• Relieve pipe loads on pump and adjust belt tension.
	c)	Excessive operation pressure	• If all other aspects of the filter system are ok then reduce drive speed to provide 7 psi max pressure.
4. Lack of air volume			
	a)	Slipping belts	• Correct belt tension
	b)	Worn clearances	• Restore clearances per manufactures recommendations.
	c)	Leak in system	• Check for leaks in pipe lines and connection from pump to cleaning mechanism. Repair as needed.
5. Excessive bearing or gear wear			
	a)	Improper lubrication	• Correct oil level and follow lubrication schedule.
	b)	Worn filter	• Replace filter
6. Loss of oil			
	a)	Vents plugged	• Check and replace vents in headplate, gear case or drive cover
	b)	Worn seals	• Check for leakage around head plate and gear case. Replace leaking seals.

The above is intended as a quick reference for common problems that may be encountered with a dust filter. If you are experiencing any difficulties not covered above or have any questions concerning your MAC filter, contact your local MAC representative or the MAC Equipment Service Center at 1-888-821-2476.

ORDERING SPARE PARTS

To order by Phone, dial **1-888-821-2476**. When placing an order for spare parts always give the following:

1. Model Number
2. Serial Number
3. Part Description
4. Part Number
5. Quantity Required
6. MAC Job Number (or Sales Order Number)

MAC
P.O. Box 205, Sabetha, Kansas 66534

Serial Number

Model Number

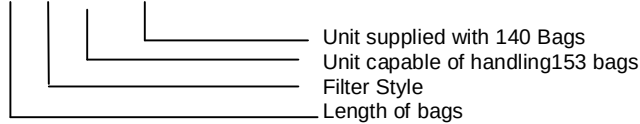
Customer P.O. Number

Order Acknowledgement

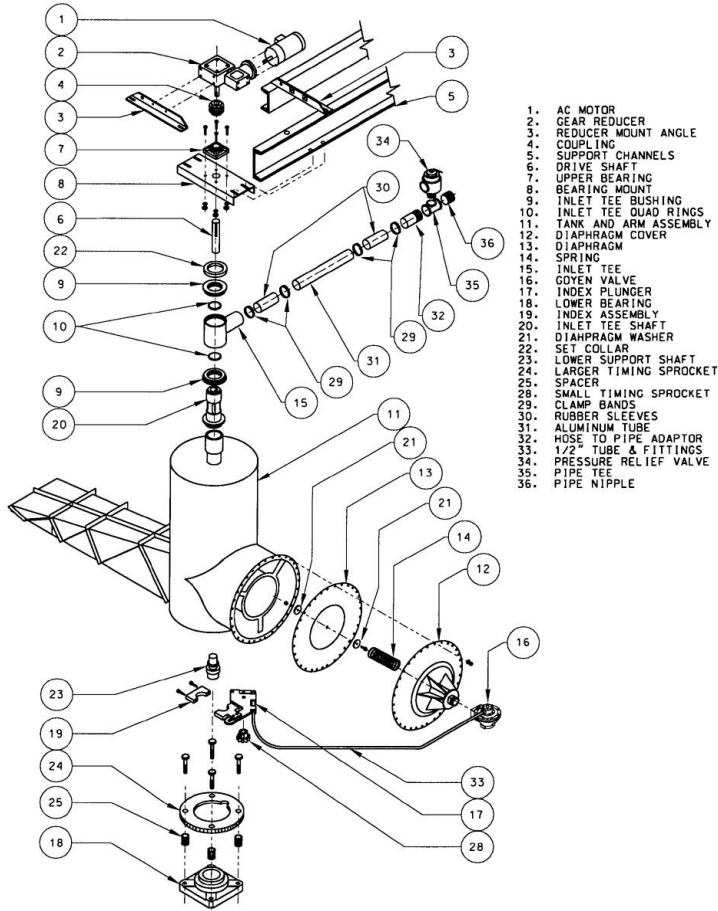
SALES ORDER NO.	RVSN	DATE	PAGE
CUSTOMER ORDER NO.			
ORDER DATE		SALES CAT.	TAXABLE
METHOD OF SHIPMENT		F.O.B.	PPD
S.A.			
TERMS			

Model Designations

96MCF153-140



Cleaning Mechanism



MCF FILTER CLEANING MECHANISM
MCF 572 AND SMALLER

Figure 9-1 Typical Cleaning Mechanism

Cleaning Mechanism Spare Parts List

Item No.	Part No.	Description
4	307262	Rubber Sleeve
"	307246	Coupling 1-1/4" Bore
"	307254	Coupling 1-3/8" Bore
"	307122	Coupling 1" Bore
"	307033	Coupling 5/8" Bore
7	149217	Top Shaft Bearing 1-3/8" (4) Bolt Flange
9 & 10	415670	Quad Rings & Bushings

13	628710	10" Diaphragm (MCF 112,153, 255, 416)
"	628720	12" Diaphragm (MCF 361, 494, 572)
14	122270	10" Diaphragm Spring (MCF 112,153, 255, 416)
"	122289	12" Diaphragm Spring (MCF 361, 494, 572)
15	473049	Inlet Tee Assembly
16	314668	Secondary Diaphragm Valve
17	413226	Replacement Tip, Shaft, Spring, & Chain Link
--	395780	Replacement Spring
18	330353	Bottom Shaft Bearing 1-7/16" (4) Bolt Flange
18	308535	Bottom Shaft Bearing 1-1/4" (4) Bolt Flange (MCF112)
19	402069	Index Sensor
24	424732	Timing Sprocket (MCF 112)
"	409924	Timing Sprocket (MCF 153-255)
"	409925	Timing Sprocket (MCF 361)
"	409926	Timing Sprocket (MCF416-572)
--	119156	Cleaning Arm Nozzle
--	122998	Blank-off Plug

Top Removal Bags (5" diameter)

Bag Length	16 Oz. Dacron	14 Oz. Polypropylene
96"	119849	119881
120"	119822	119873
144"	118915	119857

Top Removal Cages (5" diameter)

	Galvanized Cage Length and Part Number		
Filter Style	96"	120"	144"
MCF/MPH	105473	105481	105490

Top Removal Bags (6.2" diameter)

Bag Length	16 Oz. Dacron	14 Oz. Polypropylene
96"	101451	101524
120"	101443	101516
144"	101435	101508

Top Removal Cages (6.2" diameter)

	Galvanized Cage Length and Part Number		
Filter Style	96"	120"	144"
MCF/MPH	105350	105341	105333

Miscellaneous Spare Parts

Item No.	Part No.	Description
--	415672	Aluminum 36 x 36 Panel w/ Gasket & Bolts
--	103241	PVC 3/8" x 1" Bolts for Explosion Vent
--	111090	Magnehelic Gauge 0-15" WC